

**FINAL
REMEDIAL ACTION PLAN/ RECORD OF DECISION
FOR THE MARSH CRUST AT THE
FLEET AND INDUSTRIAL SUPPLY CENTER OAKLAND
ALAMEDA FACILITY/ALAMEDA ANNEX
AND FOR THE MARSH CRUST AND FORMER
SUBTIDAL AREA AT ALAMEDA POINT**

February 2001

CONTENTS

<u>Section</u>	<u>Page</u>
ACRONYMS AND ABBREVIATIONS	iv
1.0 DECLARATION.....	1-1
1.1 SITE NAME AND LOCATION.....	1-1
1.2 STATEMENT OF BASIS AND PURPOSE.....	1-2
1.3 ASSESSMENT OF THE SITE.....	1-2
1.4 DESCRIPTION OF THE SELECTED REMEDY	1-2
1.5 DECLARATION/STATUTORY DETERMINATION.....	1-6
2.0 DECISION SUMMARY	2-1
2.1 SITE NAME, LOCATION, AND DESCRIPTION.....	2-1
2.1.1 Site Name and Location.....	2-1
2.1.2 Lead and Support Agencies.....	2-1
2.1.3 Site Type and Description	2-1
2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES.....	2-2
2.2.1 Facility History	2-2
2.2.2 Environmental Investigations and Remedial Actions	2-4
2.2.3 Enforcement Activities	2-5
2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION	2-5
2.4 SCOPE AND ROLE OF RESPONSE ACTION FOR ALAMEDA FACILITY/ALAMEDA ANNEX AND ALAMEDA POINT	2-6
2.5 SITE CHARACTERISTICS	2-7
2.5.1 Geology	2-7
2.5.2 Hydrogeology	2-8
2.5.3 Contamination in the Marsh Crust and Former Subtidal Area.....	2-8
2.6 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES.....	2-9
2.6.1 Demography and Land Use.....	2-10
2.7 SUMMARY OF SITE RISKS	2-11
2.7.1 Summary of Human Health Risk Assessment.....	2-11
2.7.2 Ecological Risk Assessment	2-13
2.7.3 Basis for Action	2-14
2.8 REMEDIAL ACTION OBJECTIVES	2-14

CONTENTS (Continued)

<u>Section</u>	<u>Page</u>
2.8.1 Remedial Action Objective for the Former Subtidal Area and Marsh Crust	2-14
2.9 DESCRIPTION OF ALTERNATIVES.....	2-14
2.9.1 Remedial Alternatives for Marsh Crust and Former Subtidal Area	2-14
2.10 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES	2-24
2.11 PRINCIPAL THREAT WASTES	2-28
2.12 SELECTED REMEDY	2-28
2.13 STATUTORY DETERMINATIONS	2-32
2.13.1 Protection of Human Health and the Environment	2-32
2.13.2 Compliance with Applicable or Relevant Appropriate Requirements	2-32
2.13.3 Cost-Effectiveness	2-33
2.13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable	2-33
2.13.5 Preference for Treatment as a Principal Element.....	2-34
2.13.6 Five-year Review Requirements	2-34
2.14 DOCUMENTATION OF SIGNIFICANT CHANGES.....	2-34
REFERENCES	R-1

Appendix

A	NONBINDING ALLOCATION OF RESPONSIBILITY
B	CITY OF ALAMEDA ORDINANCE NO. 2824
C	ADMINISTRATIVE RECORD INDEX
D	CALIFORNIA ENVIRONMENTAL QUALITY ACT NEGATIVE DECLARATION
E	RESPONSIVENESS SUMMARY
F	SUMMARY OF TEXT CHANGES

FIGURES

Figure

- 1 SITE LOCATION MAP
- 2 FILL PLACEMENT
- 3 EXISTING AND OLD SHORELINES FOR EAST BAY MARGIN
- 4 EXTENT OF FORMER SUBTIDAL AREA AND TIDAL MARSHLAND
- 5 DEPTH TO TOP OF FORMER SUBTIDAL AREA AND TIDAL MARSHLAND

TABLES

Table

- 1 SUMMARY OF RISK CHARACTERIZATION FOR FLEET AND INDUSTRIAL SUPPLY CENTER OAKLAND, ALAMEDA FACILITY/ALAMEDA ANNEX AND ALAMEDA POINT
- 2 COMPARATIVE ANALYSIS OF ALTERNATIVES FOR THE MARSH CRUST AT FLEET AND INDUSTRIAL SUPPLY CENTER OAKLAND, ALAMEDA FACILITY/ALAMEDA ANNEX AND THE MARSH CRUST AND FORMER SUBTIDAL AREA AT ALAMEDA POINT

ACRONYMS AND ABBREVIATIONS

Airdrome	San Francisco Bay Airdrome
ARAR	Applicable or relevant and appropriate requirement
BAAQMD	Bay Area Air Quality Management District
B(a)P	Benzo(a)pyrene
bgs	Below ground surface
BRAC	Base Realignment and Closure
CCR	California Code of Regulations
Cal/EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Chemical of concern
DMB	Data management bench mark
DoD	Department of Defense
DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
ERA	Ecological risk assessment
FFSRA	Federal Facility Site Remediation Agreement
FISC	Fleet and Industrial Supply Center
FISCO	Fleet and Industrial Supply Center, Oakland
FS	Feasibility study
GAC	Granular activated carbon
HSAA	Hazardous Substances Account Act
HSC	Health and Safety Code
IR	Installation restoration
IRP	Installation Restoration Program
LRA	Local Reuse Authority
LUCICP	Land Use Control Implementation and Certification Plan
NAS	Naval Air Station
Navy	Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NSC	Naval Supply Center
O&M	Operation and maintenance
Ordinance	City of Alameda Ordinance No. 2824
OU	Operable unit

ACRONYMS AND ABBREVIATIONS (Continued)

PA/SI	Preliminary assessment/site inspection
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PRC	PRC Environmental Management, Inc.
PRG	Preliminary Remediation Goal
RAB	Restoration Advisory Board
RAO	Remedial action objective
RAP	Remedial action plan
RI	Remedial investigation
ROD	Record of decision
RWQCB	Regional Water Quality Control Board
SVOC	Semivolatile organic compound
TtEMI	Tetra Tech EM Inc.
TPH	Total petroleum hydrocarbons
yd ³	Cubic yard

1.0 DECLARATION

1.1 SITE NAME AND LOCATION

This remedial action plan/record of decision (RAP/ROD) addresses two adjoining, closing naval installations located in Alameda, California. They are:

- Fleet and Industrial Supply Center Oakland (FISCO)
Alameda Facility/Alameda Annex
Alameda, California
- Alameda Point (former Naval Air Station [NAS])
Alameda, California

In 1996, Alameda Facility/Alameda Annex was designated for closure under the Base Realignment and Closure (BRAC) Act of 1990. It was closed as of September 1998. Alameda Facility/Alameda Annex is not on the National Priorities List (NPL). Eight installation restoration (IR) sites, the marsh crust, and shallow groundwater were identified in the past as potentially being contaminated. The marsh crust is a layer of sediment contaminated with semivolatile organic compounds (SVOC) that was deposited across the Alameda Facility/Alameda Annex from the late 1800s until the 1920s. The contamination is believed to have resulted from direct discharges of petroleum products and wastes from former manufactured gas plants and oil refineries to the marshlands. This RAP/ROD for Alameda Facility/Alameda Annex addresses only the marsh crust. Please note that this is a change from the draft RAP/ROD that addresses groundwater at Alameda Facility/Alameda Annex. Additional RAP/RODs will be prepared for other IR sites and contamination in the shallow groundwater at Alameda Facility/Alameda Annex.

Alameda Point was identified for closure under BRAC in September 1993, and the installation ceased all naval operations in April 1997. Alameda Point was listed on the NPL in 1999. The NPL listing does not include the subsurface soil contamination layer known as the marsh crust and the former subtidal area. Twenty-nine IR sites, the marsh crust, and the former subtidal area were identified in the past as potentially being contaminated. Like the marsh crust, the former subtidal area is a layer of sediment contaminated with SVOCs; however, it was deposited on tidal flats at the western end of Alameda Point, rather than on the marshes. This RAP/ROD for Alameda Point addresses only the marsh crust and the former subtidal area.

1.2 STATEMENT OF BASIS AND PURPOSE

This RAP/ROD decision document presents the remedy selected by the Department of the Navy (Navy) for the marsh crust at Alameda Facility/Alameda Annex and the marsh crust and the former subtidal area at Alameda Point. The selected remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). In addition, the selected remedy was chosen in accordance with the State of California Hazardous Substance Account Act (HSAA), which is contained in Chapter 6.8 of the California Health and Safety Code (HSC), and specifically complies with California HSC Section 25356.1. Appendix A contains the nonbinding allocation of responsibility required by the California HSC and prepared by the California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC). This decision document is based on the administrative record file for Alameda Facility/Alameda Annex and for Alameda Point.

DTSC, the U.S. Environmental Protection Agency (EPA), and the California Regional Water Quality Board (RWQCB) concur with the selected remedy.

1.3 ASSESSMENT OF THE SITE

Hazardous substances are present in the marsh crust at Alameda Facility/Alameda Annex. At Alameda Point, hazardous substances are present in the marsh crust and former subtidal area. The response action selected in this RAP/ROD is necessary to protect public health or welfare or the environment from potential releases of hazardous substances into the environment.

1.4 DESCRIPTION OF THE SELECTED REMEDY

The selected remedy is the final, comprehensive remedial action to address the marsh crust at Alameda Facility/Alameda Annex and to address the marsh crust and former subtidal area at Alameda Point. Site-specific RAP/RODs will be prepared in the future to address the selected remedy for soil at IR sites and the shallow groundwater at Alameda Facility/Alameda Annex. Operable unit-specific RAP/RODs will be prepared in the future to address contaminated soil and groundwater at Alameda Point. Either the determination that "all necessary remedial action necessary to protect human health and the environment with respect to any such substance remaining on the property has been taken before the date of such transfer,..." as provided under Section 120(h)(3)(A)(ii)(I) of CERCLA or, in the case of early transfers,

the determinations required by Section 120(h)(3)(C)(i) of CERCLA, will be made at a date subsequent to the date of issuance of this RAP/ROD and prior to the conveyance of individual parcels."

Based on the results of the remedial investigation (RI), the Navy has concluded that compounds in the marsh crust at Alameda Facility/Alameda Annex and in the marsh crust and former subtidal area at Alameda Point could pose an unacceptable risk to human health or the environment under future land use. A potential future exposure scenario that could result in unacceptable risk at Alameda Facility/Alameda Annex and Alameda Point is the possibility that future construction activities could raise the contaminated marsh crust and deposits from the former subtidal area to the surface, where they could remain as a source of exposure.

Therefore, the Navy and DTSC, with the concurrence of EPA and the RWQCB, have selected the following remedy

- **Land Use Controls for the Marsh Crust at Alameda Facility/Alameda Annex and Alameda Point and the Former Subtidal Area at Alameda Point:** The Navy and DTSC, with the concurrence of EPA and RWQCB, have selected land use controls as the remedy for the marsh crust and former subtidal area. The selected remedy addresses principal threats by restricting future site occupants from excavating into the marsh crust and deposits from the former subtidal area, unless proper procedures are used to ensure that workers are not unduly exposed and that all contaminated material brought to the surface undergoes appropriate disposal. The selected remedy of institutional controls consists of the following three tiers of land use controls:

- Environmental Restrictions in Deed

The Navy has included Environmental Restrictions addressing marsh crust land use controls pursuant to California Civil Code Section 1471 in the deeds transferring title to Fleet and Industrial Supply Center (FISC) Alameda and East Housing Portion of NAS Alameda to the City of Alameda on July 20, 2000. The Environmental Restrictions require that the City of Alameda and its transferees comply with the City of Alameda Ordinance No. 2824 (included as Appendix B), passed on February 15, 2000, when excavating below specified threshold depths or, when excavating with DTSC approval if the Ordinance is repealed or DTSC determines that the Ordinance does not comply with the Covenant to Restrict Use of Property (discussed below in Item 2). These Environmental Restrictions shall be interpreted in a manner that is consistent with and does not conflict with the Covenant to Restrict Use of Property between DTSC and the City of Alameda. These Environmental Restrictions (1) run with the land; (2) are for the benefit of, and enforceable by, the Navy; (3) are binding upon future owners and occupants of the property; and (4) shall be enforced by the Navy when necessary and appropriate. The deed provides that failure to enforce the Environmental Restrictions in the Covenant between DTSC and the City of Alameda shall not preclude the Navy from enforcing the equivalent Environmental Restrictions in

the deed. In the future, deeds transferring title to former Navy properties included in the marsh crust and subtidal area of Alameda Point will contain these Environmental Restrictions, as appropriate.

- Covenant to Restrict Use of Property

On July 20, 2000, DTSC and the City of Alameda entered into a Covenant to Restrict Use of Property (Covenant) that includes Environmental Restrictions addressing marsh crust land use controls pursuant to California Civil Code Section 1471 and HSC Section 25355.5. The Environmental Restrictions prohibit excavation below specified threshold depths, except in compliance with the City of Alameda Ordinance No. 2824, passed on February 15, 2000 (see description below), or with DTSC approval if the Ordinance is repealed or DTSC determines that the Ordinance does not comply with the Covenant. The Covenant covers FISCO Alameda Facility/Alameda Annex and Alameda NAS East Housing and contains Environmental Restrictions that (1) run with the land; (2) are for the benefit of and enforceable by DTSC; and (3) are binding upon future owners and occupants of the property. In the future, transfers of former Navy properties included in the marsh crust and subtidal area of Alameda Point will require a similar covenant.

- Marsh Crust Ordinance

The City of Alameda has enacted City of Alameda Ordinance No. 2824, passed on February 15, 2000, and included as Appendix B, that prohibits engaging in any excavation below specified threshold depths on former Navy property without an excavation permit and without taking proper measures to ensure that workers are not unduly exposed and that all contaminated material brought to the surface is properly disposed of. The City of Alameda will directly implement and enforce the Ordinance. If the excavation Ordinance is repealed in the future, or if DTSC has made a written determination with 30 days prior written notice to the City of Alameda that the excavation Ordinance does not comport with the intent of the DTSC-City Covenant, then a permitted excavation may be conducted only in accordance with written approval by DTSC. The permittee's application for such an approval will be submitted to DTSC and would comply with the permit application requirements of the last version of the excavation ordinance or other requirements as DTSC may specify.

The roles and responsibilities for implementing, monitoring, and enforcing the land use controls selected in this RAP/ROD will be documented in a Land Use Control Implementation and Certification Plan (LUCICP), which will be prepared after the completion of the RAP/ROD. The LUCICP will include the following elements:

- Site descriptions, a map showing the site locations and the approximate size of the site, and a description of any chemicals of concern (COC)

- The land use control objectives and restrictions stated in the RAP/ROD
- The specific legal mechanism that will be used to achieve the RAP/ROD's land use control objectives and restrictions
- The required frequency for periodic inspections of the sites
- Identification of the entities responsible for implementation of the monitoring and inspections
- Methods that will be used to periodically certify compliance with institutional controls upon completion of inspections
- Procedures for notifying the Navy and the signatories to the Federal Facility Site Remediation Agreement (FFSRA) in the event of a failure to comply with land use restrictions

The draft LUCICP will be provided to FFSRA signatories and EPA for approval and to the Local Reuse Authority (LRA) and the transferee for review.

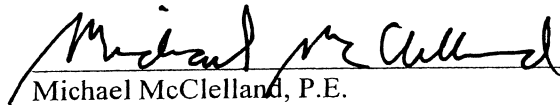
The following information is included in the Decision Summary section of this RAP/ROD. Additional information can be found in the Administrative Record file for this site.

- COCs and their respective concentrations
- Baseline risk represented by COCs
- Cleanup levels established for COCs and the basis for these levels
- How source materials that constitute principal threats are addressed
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and RAP/ROD
- Potential land use that will be available at the site as a result of the selected remedy
- Estimated capital, annual operation and maintenance (O&M), total present worth costs, the discount rate, and the number of years over which remedy cost estimates are projected
- Key factor(s) that led to selecting the remedy (that is, how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision)

1.5 DECLARATION/STATUTORY DETERMINATION

The selected remedy for the marsh crust at Alameda Facility/Alameda Annex and Alameda Point and the former subtidal area at Alameda Point is protective of human health and the environment. It complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action and is cost-effective. This remedy makes use of permanent solutions to the maximum extent practicable. However, the selected remedy does not satisfy the statutory preference for remedies that employ treatment to reduce toxicity, mobility, or volume of contaminants as a principal element. Treatment was not considered to be easily implementable or cost-effective for the marsh crust and former subtidal area at Alameda Facility/Alameda Annex and Alameda Point.

Because the selected remedy may allow hazardous substances to remain on site above levels that allow for unrestricted use, a statutory review will be conducted within 5 years after remedial action begins to ensure that the selected remedy for the former subtidal area and marsh crust continues to provide adequate protection of human health and the environment.

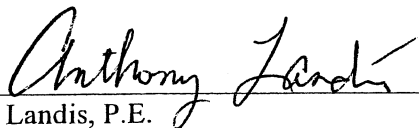

Michael McClelland, P.E.
BRAC Environmental Coordinator
Alameda Facility/Alameda Annex and Alameda Point

Feb 1, 2001
Date

1.5 DECLARATION/STATUTORY DETERMINATION

The selected remedy for the marsh crust at Alameda Facility/Alameda Annex and Alameda Point and the former subtidal area at Alameda Point is protective of human health and the environment. It complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action and is cost-effective. This remedy makes use of permanent solutions to the maximum extent practicable. However, the selected remedy does not satisfy the statutory preference for remedies that employ treatment to reduce toxicity, mobility, or volume of contaminants as a principal element. Treatment was not considered to be easily implementable or cost-effective for the marsh crust and former subtidal area at Alameda Facility/Alameda Annex and Alameda Point.

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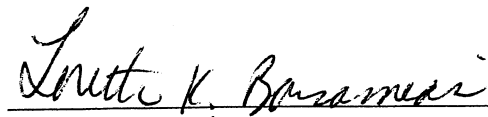
Anthony Landis, P.E.
Chief, Northern California Operations,
Office of Military Facilities
California Environmental Protection Agency,
Department of Toxic Substances Control

2-2-01
Date

1.5 DECLARATION/STATUTORY DETERMINATION

The selected remedy for the marsh crust at Alameda Facility/Alameda Annex and Alameda Point and the former subtidal area at Alameda Point is protective of human health and the environment. It complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action and is cost-effective. This remedy makes use of permanent solutions to the maximum extent practicable. However, the selected remedy does not satisfy the statutory preference for remedies that employ treatment to reduce toxicity, mobility, or volume of contaminants as a principal element. Treatment was not considered to be easily implementable or cost-effective for the marsh crust and former subtidal area at Alameda Facility/Alameda Annex and Alameda Point.

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Loretta K. Barsamian
Executive Officer
California Regional Water Quality Control Board

1.12.01
Date



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

VIA FACSIMILE
(619) 532-1554

February 13, 2001

Mr. Dana Sakamoto
Engineering Field Division Southwest, BRAC Offices
1220 Pacific Highway
San Diego, CA 92132

Re: Remedy Approval for Marsh Crust at FISC Alameda Annex and Marsh Crust and Former Subtidal Area at Alameda Naval Air Station

Dear Mr. Sakamoto:

The U.S. Environmental Protection Agency (U.S. EPA) has received and reviewed "Final Remedial Action Plan/Record of Decision for Marsh Crust at Fleet and Industrial Supply Center Oakland Alameda Facility/Alameda Annex and for Marsh Crust and Former Subtidal Area at Alameda Point" (Final Marsh Crust RAP/ROD). The Final Marsh Crust RAP/ROD was prepared by Tetra Tech EM Inc., on behalf of the Department of the Navy (Navy) and is dated January 10, 2001.

Based upon review of the Final Marsh Crust RAP/ROD and as our formal response to the final submittal, U.S. EPA agrees with the selection of Land Use Controls as the established remedy for Marsh Crust at FISCO Alameda Annex and Marsh Crust and Former Subtidal Area at Alameda Naval Air Station. U.S. EPA is providing approval for the remedy, as opposed to concurrence, because we consider the Marsh Crust Land Use Controls to be a non-NPL remedy.

If you have any questions, please contact me at (415) 744-2420 or you may also call Phillip Ramsey of my staff at (415) 744-2365.

Sincerely,

A handwritten signature in cursive script, appearing to read "Daniel A. Meer".

Daniel A. Meer
Chief, Federal Facilities Cleanup Branch

Copy to: (attached)

2.0 DECISION SUMMARY

The decision summary provides an overview of site characteristics, alternatives evaluated, and the analysis of those options. It also identifies the selected remedy and explains how the remedy fulfills statutory and regulatory requirements.

2.1 SITE NAME, LOCATION, AND DESCRIPTION

This section contains basic information about each facility, including its location, lead and support agency, and a description.

2.1.1 Site Name and Location

Alameda Facility/Alameda Annex is located about 1 mile southeast of the FISCO main base and less than 1 mile east of the former NAS Alameda, along the southern shore of the Oakland Inner Harbor in Alameda, California (see Figure 1). NAS Alameda is now known as Alameda Point. Alameda Point is located on the western end of Alameda Island, adjacent to Alameda Facility/Alameda Annex (see Figure 1).

2.1.2 Lead and Support Agencies

The Navy is the lead agency for the investigation and cleanup of Alameda Facility/Alameda Annex and Alameda Point. DTSC, EPA, and RWQCB are the regulatory support agencies, as defined by the NCP. Pursuant to state law, DTSC is the lead regulatory agency for the non-NPL areas (that is, the marsh crust and East Housing site). For areas that are on the NPL, such as IR sites at Alameda Point, EPA has a necessary concurrence role in the selection of the remedy.

2.1.3 Site Type and Description

Alameda Facility/Alameda Annex occupies about 143 acres and served during its period of operation as part of the main supply facility supporting Department of Defense (DoD) operations of military fleets and shore activities in the Pacific Basin. Alameda Point occupies about 2,675 acres and was a major center of naval aviation for Pacific Fleet ships.

From the late 1800s until the 1920s, two manufactured gas plants and an oil refinery were located near the present locations of Alameda Facility/Alameda Annex and Alameda Point. These facilities are

believed to have discharged petroleum products and wastes and possibly, CERCLA hazardous substances to adjacent marshlands, during their operation. The waste migrated over much of the surface of the surrounding marsh and was deposited on the marsh surface through tidal actions, leaving a discontinuous layer of contaminated sediment under the 143-acre area that is now Alameda Facility/Alameda Annex and the eastern portion of the 2,675-acre area that is now Alameda Point. This layer is known as the marsh crust. Farther to the west at Alameda Point, the waste was deposited on tidal flats, now known as the former subtidal area. Fill material dredged from the Oakland Inner Harbor and sediment from locations surrounding San Francisco Bay were placed on these areas from as early as 1887 to as late as 1975, encapsulating the former subtidal area and marsh crust.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

This section provides background information about each facility, including activities that have led to the current environmental conditions, site investigations, and removal actions conducted to date.

2.2.1 Facility History

Until the 1920s, the Alameda Facility/Alameda Annex and Alameda Point facilities and the surrounding area existed as undeveloped marshlands and tidal flats along the fringe of San Francisco Bay. The area south of the facilities consisted primarily of residential properties. Before 1930, at least two large industrial sites (an oil refinery and a borax processing plant) were located on the western tip of Alameda Island. Several industries were located on the northern side of Oakland Inner Harbor, including two manufactured gas plants.

Many of these industries are believed to have stored and used hazardous materials and generated hazardous wastes during their daily operations and manufacturing processes (PRC Environmental Management [PRC] 1996a). In particular, lighter hydrocarbon by-products and sludges laden with polynuclear aromatic hydrocarbons (PAH) are likely to have been discharged directly into the waters of San Francisco Bay or the Oakland Inner Harbor. Because many of these materials are lighter than water, they would have floated and been transported by tidal flows into the marsh by historical tidal channels. These materials are believed to have been deposited along the sides of the tidal channels and marsh surface. This deposited material is the marsh crust that currently exists between 10 and 20 feet (at an average depth of 15 feet below ground surface [bgs]) at Alameda Facility/Alameda Annex (PRC 1996a). These same materials appear to have been deposited in sediments, ranging from 4 to 10 feet bgs (at an average depth of 8 feet bgs), at Alameda Point. These materials are referred to as the former subtidal

area and marsh crust at Alameda Point. The history of Alameda Facility/Alameda Annex and Alameda Point is described below.

History of Alameda Facility/Alameda Annex

From 1900 to 1939, the area that now comprises the Alameda Facility/Alameda Annex was covered with fill soil obtained from unknown sources (International Technology Corporation 1998); it is likely that the fill came from dredge spoils from the Oakland Inner Harbor (see Figure 2).

A commercial airport known as the San Francisco Bay Airdrome (Airdrome) was constructed in the mid-1920s in the current location of the facility's southern portion. The Airdrome consisted of a 2,500-foot runway, a passenger terminal, and an aircraft maintenance hangar. Aircraft maintenance would likely have involved use and storage of hazardous materials and generation of associated wastes in the form of solvents, paints, and petroleum-based products (such as aircraft fuel and lubricating oil). The Airdrome reached peak operation by 1932, serving about 11,000 customers per month. In 1941, wartime activities at nearby NAS Alameda caused air traffic conflicts, resulting in closure of the Airdrome (PRC 1996a).

The U.S. Government purchased the property that now comprises the facility from the Regents of the University of California. An elongated piece of property, which consists of multiple sets of railroad tracks and bisects the facility from east to west, belongs to the Southern Pacific Railroad. In 1946, the U.S. Government purchased the portion of the facility south of the Southern Pacific railroad tracks, and in 1966, purchased the portion north of the Southern Pacific railroad tracks. The facility consists of two parts: the Alameda Facility (the portion north of Southern Pacific railroad tracks) and the Alameda Annex (the portion south of Southern Pacific railroad tracks). The property comprising the Alameda Facility was occupied by the Alameda Medical Depot of the U.S. Army as of 1945 and was later used by Sharpe Army Depot. In 1964, command of the Alameda Facility was transferred to the Naval Supply Center (NSC) Oakland. The property that comprises the Alameda Annex was assigned to NAS Alameda in 1951. In 1980, the Alameda Annex was transferred to NSC Oakland.

The facility, in conjunction with NSC Oakland, served as the main supply facility supporting DoD operations of military fleets and shore activities in the Pacific Basin. The Defense Logistics Agency Defense Reutilization and Marketing Office occupied warehouse space and former parking lots for display of saleable general surplus military goods. The Fleet Hospital Support Office used some of the warehouses and former parking lots to store hospital supplies. In 1996, the Alameda Facility/Alameda Annex was designated for closure, and it was closed in September 1998 under BRAC.

History of Alameda Point

The western tip of Alameda Island (prior to the construction of Alameda Point) was used as farmland before it became an industrial and transit center. Railroad yards and rights-of-way for Southern Pacific, Central Pacific, and small local railways were built over the site and sloughs to the north. The western terminus for the transcontinental railroad was at the southeastern corner of the site for a short period in 1869. The Army acquired the western tip of Alameda Island from the City of Alameda in 1930 and began construction in 1931. In 1936, the Navy acquired title to the land from the Army and began building NAS Alameda in response to the military buildup in Europe before World War II. The construction involved filling the natural tidelands, marshes, and sloughs between the Oakland Inner Harbor and the western tip of Alameda Island. The fill largely consisted of dredge spoils from the surrounding San Francisco Bay and Oakland Inner Harbor. After the United States entered the war in 1941, the Navy acquired more land west of the installation. After the end of the war in 1945, the installation continued its primary mission of providing facilities and support for fleet aviation activities. While it operated as an active naval base, the installation provided berthing for Pacific Fleet ships and was a major center of naval aviation.

Alameda Point was identified for closure in September 1993. The installation ceased all naval operations in April 1997, and the Navy is currently returning the land to the City of Alameda. The Navy is working with the City of Alameda and the Alameda Reuse and Redevelopment Authority to identify appropriate reuse for the land.

2.2.2 Environmental Investigations and Remedial Actions

Alameda Facility/Alameda Annex and Alameda Point have undergone investigations for environmental contamination and remedial action. These investigations and remedial actions are discussed below.

Alameda Facility/Alameda Annex

The Navy began investigating sites under the Installation Restoration Program (IRP) beginning in the 1980s. Eight IRP sites were identified at Alameda Facility/Alameda Annex as a result of a preliminary assessment/site inspection (PA/SI) (National Energy and Environmental Support Activity 1988) under CERCLA and a Resource Conservation and Recovery Act facility assessment (DTSC 1993). A FFSRA between the Navy and the State of California was signed in 1992 for subsequent investigations and response actions.

An RI has been conducted at seven of the eight IR sites within Alameda Facility/Alameda Annex. No RI was conducted for Site IR01; the PA/SI report concluded that no further investigation was necessary at that site, because no evidence existed of a release of hazardous substances, pollutants, or contaminants. As part of the RI for IR02 – IR08, samples were collected of shallow soil (soil from the surface to 10 feet bgs), deep soil (soil from 10 feet to 22.5 feet bgs), and shallow and deep groundwater. Complete descriptions of these investigations can be found in the Alameda Facility/Alameda Annex RI report (PRC 1996a).

Two removal actions were completed at IR02 for soil contaminated with polychlorinated biphenyls (PCB) and lead. The Navy is preparing to conduct a remedial action for additional surface soil contaminated with PCBs and cadmium at IR02 (PRC 1996b; Tetra Tech EM, Inc. [TtEMI] 1998b). Two removal actions were completed for contaminated sediment and debris from the storm water drainage system at Alameda Facility/Alameda Annex (TtEMI 1998a). A summary of these removal actions can be found in the feasibility study (FS) report (TtEMI 1999b, 1999d) for Alameda Facility/Alameda Annex.

Alameda Point

Several phases of investigation have been conducted at the 29 IR sites at Alameda Point for soil, sediment, and groundwater. Six operable units (OU) have been designated to streamline the investigation and reporting process. To date, RI reports for OU-1 (TtEMI 1999a), OU-2 (TtEMI 1999g), and OU-3 (TtEMI 1999c) have been prepared. The RI report for OU-4 and OU-5 are being prepared. Because this RAP/ROD addresses only the former subtidal area and marsh crust, the results of the OU-1, OU-2, and OU-3 RIs are not summarized. Instead, investigative results related to the former subtidal area and marsh crust are presented in Section 2.5.3. In May 2000, DTSC prepared a Removal Action Workplan for Marsh Crust at East Housing (DTSC 2000).

2.2.3 Enforcement Activities

No enforcement actions are pending at the installations.

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Navy formed restoration advisory boards (RAB) in March 1995, consisting of members of the Navy, the community, and regulatory agencies, for Alameda Facility/Alameda Annex and Alameda Point. The

RABs meet regularly and provide input into cleanup at these two installations. The RABs are also sources of information regarding future anticipated land use and potential beneficial uses of groundwater.

2.4 SCOPE AND ROLE OF RESPONSE ACTION FOR ALAMEDA FACILITY/ALAMEDA ANNEX AND ALAMEDA POINT

The RI report for Alameda Facility/Alameda Annex was finalized in January 1996. The FS report for the marsh crust, the former subtidal area, and shallow groundwater was finalized in March 2000. The proposed plan for Alameda Facility/Alameda Annex and Alameda Point was made available to the public on June 20, 2000. The RI report, FS report, proposed plan, and draft RAP/ROD were made available to the public through information repositories, which contain the administrative record index (see Appendix C) and materials related to the environmental cleanup program at Alameda Facility/Alameda Annex and Alameda Point. The information repositories are located at the Alameda Public Library, 220 A Central Avenue, Alameda, California, and the Alameda Point Library, 950 West Mall Square, Main Office Building (Building 1), Alameda Point, Alameda, California. In accordance with the California Environmental Quality Act, DTSC has conducted an Initial Study for the selected remedy. A proposed Negative Declaration was also made available through the information repositories. The notice of availability for the proposed plan, the draft RAP/ROD and the Negative Declaration (see Appendix D) was published in the Oakland Tribune and the Alameda Times on June 20, 2000. A public comment period was held from June 20 to July 20, 2000. A public meeting was held on June 29, 2000. At the meeting, representatives from the Navy, DTSC, EPA, and RWQCB answered questions about the proposed plan and the preferred alternatives. A response to comments received during the public comment period is presented in the responsiveness summary, which is included as Appendix E of this RAP/ROD. These activities fulfill the requirements of the HSAA (HSC Section 25356.1), CERCLA community participation requirements of Sections 113(k)(2)(B)(i-v) and 117(a)(2), and the NCP, 40 Code of Federal Regulations (CFR) Section 300.430(f)(3). Subsequent to the publication of the Draft RAP/ROD and the aforementioned public meeting, the Navy and DTSC agreed to remove the groundwater portion of this RAP/ROD. A RAP/ROD for groundwater at Alameda Facility/Alameda Annex will be produced separately.

This RAP/ROD selects the final remedy for the marsh crust at Alameda Facility/Alameda Annex and Alameda Point and the former subtidal area at Alameda Point. The remedy will be conducted in accordance with CERCLA and the NCP. This is the first RAP/ROD for Alameda Facility/Alameda Annex and Alameda Point. RIs were conducted at seven sites at the Alameda Facility/Alameda Annex

from June 1992 through September 1994 under the Navy's IRP, in accordance with the FFSRA. Separate RAP/RODs for soil will be prepared for IR sites and shallow groundwater at Alameda Facility/Alameda Annex. The IR sites and groundwater at Alameda Point are not addressed in this RAP/ROD. RI/FSs are currently underway for most IR sites at Alameda Point. Separate RAP/RODs will be prepared for the remaining OUs at Alameda Point.

2.5 SITE CHARACTERISTICS

This section provides a comprehensive overview of the two facilities, including geology and hydrogeology, and the probable sources and extent of contaminants detected in samples from the former subtidal area at Alameda Point and the marsh crust at both facilities. Additional information about site characteristics can be found in Section 2.1.3, Site Type and Description, and Section 2.2.2, Environmental Investigations and Remedial Actions. Specifically, sampling strategy is discussed in Section 2.2.2, and information about sources of contamination is presented in Section 2.1.3.

2.5.1 Geology

Surface and near-surface soil at Alameda Facility/Alameda Annex consists of artificial fill emplaced during historical filling of the tidal marshlands (see Figure 3) and postfill construction during site development. The fill material is characterized by sands, clays, and silts dredged from the tidal flats in the region and mixed with material from the Merritt Sand Formation. The fill is present to depths ranging from about 10 feet bgs in the northern portion of the facility to 20 feet bgs in the southern portion. The marshland layer underneath the artificial fill material on the facility was observed during investigations to be an organic-rich peat and grass layer that is about 2 to 6 inches thick, at depths that range from about 10 to 20 feet bgs (PRC 1996a). This peat and grass layer was also recognized during previous geotechnical investigations and was termed the marsh crust (Lee and Prazsker 1979). Immediately below the marsh crust layer is the Bay Mud layer, which underlies the fill material across the entire site. The Bay Mud consists of recent sediments deposited in an estuarine environment. The Merritt Sand Formation underlies the Bay Mud across most of the facility.

The geology of Alameda Point is similar to Alameda Facility/Alameda Annex. However, Alameda Point was constructed by placing fill not only on the former marshlands, but also beyond the limits of the former marshlands and into the subtidal area of San Francisco Bay (see Figures 3 and 4). As at Alameda Facility/Alameda Annex, the Bay Mud consists of recent sediments deposited in an estuarine

environment. The thickness of the Bay Mud ranges from 10 to 110 feet throughout the installation. The Bay Mud is thin or absent in the southeastern region of the installation. A layer of marsh crust in the eastern portion of the Alameda Point facility is found below the surface fill material and on top of the Bay Mud that is the same as that at Alameda Facility/Alameda Annex described above. The marsh crust layer is present at depths ranging from 4 to 10 feet bgs.

Farther west, a layer high in organic content is typically located under the fill soil and on top of the Bay Mud, in an area that was mapped as tidal flats in a 1856 U.S. Coast and Geodetic Survey study, as noted in Radbruch (1957). The layer high in organic content consists of highly decayed organic matter incorporated in the mineral soil, typically from plant detritus (such as decayed stems and leaf skeletons or humus) and algae. This layer makes up the subtidal zone that is one of the subsurface layers targeted for remedial action in this RAP/ROD. At Alameda Point, the Merritt Sand Formation also underlies the Bay Mud over most of the facility.

2.5.2 Hydrogeology

Fill material above the Bay Mud Formation constitutes the shallow, unconfined water-bearing zone beneath Alameda Point and Alameda Facility/Alameda Annex. Groundwater is usually first encountered between 4 and 6 feet bgs. The Bay Mud forms an aquitard between the shallow groundwater and the Merritt Sand that composes much of the deeper confined aquifer beneath the facility (PRC 1996a; TtEMI 1999a, TtEMI 1999g.). Regional groundwater in the shallow aquifer flows radially, toward the Oakland Inner Harbor and San Francisco Bay. Aquifer tests indicate that the Bay Mud aquitard acts as an effective hydraulic barrier between the confined aquifer and the unconfined water-bearing zone.

2.5.3 Contamination in the Marsh Crust and Former Subtidal Area

Alameda Facility/Alameda Annex

Alameda Facility/Alameda Annex was constructed on top of a tidal marshland, interlaced with numerous tidal channels. The marsh crust is thought to be a layer of refinery by-products and sludges deposited within tidal channels and up to the high water mark on the tidal marshland (TtEMI 2000). Fifty-seven wells and boreholes that extend to depths exceeding 10 feet were installed at Alameda Facility/Alameda Annex. Thirty-seven of the 57 wells or boreholes encountered the interface between the Bay Mud and fill soil, where the marsh crust is expected to be found. The mean depth of the interface was found to be

15.3 feet bgs. Based on available lithologic data, the marsh crust appears to be a discontinuous layer about 6 inches thick, located intermittently between 10 and 20 feet bgs.

Analyses of soil samples from the marsh crust in and around site IR02 indicated high concentrations of SVOCs and total petroleum hydrocarbons (TPH) (TtEMI 2000). SVOCs are common components of TPH. Because of the site's history, geology, and previous investigations, all marsh crust that underlies Alameda Facility/Alameda Annex is assumed to contain SVOCs at concentrations similar to IR02. Chemical data are presented in the RI report (PRC 1996a).

Alameda Point

Alameda Point was constructed by placing artificial fill material on top of a subtidal area and a tidal marshland. The eastern portion of Alameda Point was constructed on top of the same tidal marshland as the Alameda Facility/Alameda Annex, and the central and southeastern portions of the facility were constructed on a subtidal area adjacent to the tidal marshland and the original Alameda Island landmass. The western portion of the facility was constructed beyond the subtidal area, directly in San Francisco Bay. The same layer of refinery by-products and sludges that compose the marsh crust at the Alameda Facility/Alameda Annex appears to have been deposited on both the tidal marshland and former subtidal area at Alameda Point. Data from 133 boreholes, extending to depths below the artificial fill-Bay Mud interface, were used to define the lateral extent and chemical characteristics of the former subtidal area and the marsh crust at Alameda Point. Analysis of soil samples showed elevated levels of SVOCs. These SVOCs were selected for further evaluation in the RI, based on their high frequency of occurrence and potential to pose a risk to human health. Chemical data are presented in the OU-1 RI report (TtEMI 1999a), the OU-2 RI report (TtEMI 1999g), and the OU-3 RI report (TtEMI 1999c).

Figure 4 shows the extent of the subtidal area and tidal marshland at Alameda Facility/Alameda Annex and Alameda Point. Figure 5 shows the depth to the top of the former subtidal area and marsh crust.

2.6 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

This section discusses the current and reasonably anticipated future land uses at Alameda Facility/Alameda Annex and Alameda Point and the basis for assumptions on future use.

2.6.1 Demography and Land Use

Alameda Facility/Alameda Annex and Alameda Point are located in the City of Alameda. Land use has been industrial since the land was created from fill between 1887 and 1939. Land use at Alameda Facility/Alameda Annex is currently general industrial, including military operations with a special government-combining overlay. Alameda Point is currently a mixed-use area with family housing, along with industrial and office space. San Francisco Bay lies west of the facility. The Oakland Inner Harbor, which is north of the Alameda Facility/Alameda Annex and Alameda Point, contains a ferry terminal, shipyards, several marinas, and yacht clubs. The area east of Alameda Facility/Alameda Annex encompasses commercial and industrial properties, including the former location of a Phillips Petroleum bulk storage plant. The area south of Alameda Facility/Alameda Annex and Alameda Point consists of residential developments, including housing, elementary schools, a middle school, and the College of Alameda (PRC 1996a). The area west of Alameda Facility/Alameda Annex is occupied by the Alameda Point facility.

Future land use at Alameda Facility/Alameda Annex and Alameda Point is expected to be a continuation of current land use, which is a mixture of commercial, industrial, recreational, and residential.

Natural Resources

The Oakland Inner Harbor, which is an arm of San Francisco Bay, is adjacent to the northern boundary of both facilities. The shoreline of Oakland Inner Harbor is almost entirely modified by human activity, and a variety of industries are located along its length (including port facilities, shipbuilding and repair facilities, sand and gravel off-loading areas, and marinas). Although harbor seals and birds, including California brown pelicans, double-crested cormorants, and several species of gulls, have been observed in the Inner Harbor area, these species do not nest or feed at Alameda Facility/Alameda Annex, because it offers no supporting habitat. Similarly, of the wildlife species in the Bay Area that are classified by either state or federal governments as endangered or threatened, none nest or feed at Alameda Facility/Alameda Annex (Port of Oakland and U.S. Army Corps of Engineers 1994).

Alameda Point is almost entirely modified by human activity, and a variety of industries and activities are located at the facility (including port facilities, aircraft repair facilities, office buildings, runways, and landfills). Alameda Point includes contiguous and noncontiguous properties such as constructed breakwaters. Major habitat types present at Alameda Point are described in the OU-1 RI report (TtEMI

1999a) and include open water areas; estuarine intertidal emergent wetlands; nonnative grassland; ruderal upland vegetation; disturbed areas; beach, urban, and ornamental landscapes; and riprap. Several special status species have been identified that occur or are expected to occur at Alameda Point (U.S. Fish and Wildlife Service 1993; TtEMI 1999a).

2.7 SUMMARY OF SITE RISKS

This section summarizes the results of the HHRA and ecological risk assessment (ERA) conducted for the marsh crust and former subtidal area.

2.7.1 Summary of Human Health Risk Assessment

The baseline risk assessment estimates the risks the site will pose if no action were taken. It provides the basis for action and identifies contaminants and exposure pathways that should be addressed by the remedial action. This section of the RAP/ROD summarizes results of the baseline risk assessment for both the Alameda Facility/Alameda Annex and Alameda Point. Table 1 provides a narrative summary of the baseline risk assessment.

2.7.1.1 Identification of Chemicals of Concern

COC for Alameda Facility/Alameda Annex were identified by reviewing chemical concentration data in the RI and comparing them with concentrations known as data management bench marks (DMB). The DMBs for each chemical at the site were based on a target residential excess lifetime cancer risk of 1×10^{-6} . A chemical was deemed to be a COC if the 95 percent upper confidence level exceeded the DMB. COC for Alameda Point were identified through HHRA in the RIs for OU-1 (TtEMI 1999b), OU-2 (TtEMI 1999g), and OU-3 (TtEMI 1999c).

Alameda Facility/Alameda Annex

An HHRA was conducted at Alameda Facility/Alameda Annex as part of the final RI report for the installation (PRC 1996a). The HHRA evaluated potential risks posed by the marsh crust.

Alameda Point

HHRA have been conducted for soils, including the marsh crust and former subtidal area at OU-1 (TtEMI 1999b), OU-2 (TtEMI 1999g), and OU-3 (TtEMI 1999c).

2.7.1.2 Exposure Assessment

An HHRA exposure assessment identifies (1) mechanisms by which contaminants can be released from a site into the environment, (2) subsequent migration of contaminants through environmental media, and (3) human receptors that may be exposed to these contaminants. The marsh crust and former subtidal area are the environmental media addressed by this RAP/ROD. Contaminants associated with these media may be either site-related or related to historical non-Navy activities. Potential human exposure pathways associated with these media are summarized below.

Alameda Facility/Alameda Annex

The HHRA in the final RI report (PRC 1996a) evaluated potential risks posed by contaminants in the marsh crust at Alameda Facility/Alameda Annex. The RI report concluded that at the depth the marsh crust is now located, the material does not pose a risk to human health. However, an exposure pathway would exist for workers or residents if contaminated material were ever brought to the surface or disposed of in an uncontrolled manner.

Alameda Point

HHRAs for Alameda Point concluded that an exposure pathway could exist for workers exposed to the former subtidal area and marsh crust during construction of building foundations and utility work at depths of 4 to 10 feet bgs. In addition, if the contaminated layer were ever brought to the surface or disposed of in an uncontrolled manner, workers or residents could be exposed.

2.7.1.3 Toxicity Assessment

No COCs were identified in the HHRA for the marsh crust, because no completed exposure pathways existed; therefore, no toxicity assessment discussion is included in this RAP/ROD.

2.7.1.4 Risk Characterization

The risk characterization summarizes and combines outputs of the exposure and toxicity assessments to characterize baseline risks.

Alameda Facility/Alameda Annex

After the FS was completed, the Navy estimated risk for the future scenario of excavation and uncontrolled distribution on the surface. Risks were estimated by comparing benzo(a)pyrene (B(a)P)

concentrations in the marsh crust with the EPA Region 9 preliminary remediation goal (PRG) for residential land use. B(a)P concentrations were used for the comparison because of the compound's potential toxicity. Based on these comparisons, excess lifetime cancer risks of 2×10^{-3} were estimated for individual marsh crust borehole samples at Alameda Facility/Alameda Annex. This level of risk was determined to be unacceptable for unrestricted use.

Alameda Point

The HHRA for Alameda Point estimated that the risk to construction workers is less than 10^{-6} at all IR sites, except for IR 25, where the risk was estimated to be 3.4×10^{-5} . After the FS was completed, the Navy estimated risk for the future scenario of excavation and uncontrolled distribution on the surface. Risks were estimated by comparing B(a)P concentrations in the marsh crust to the EPA Region 9 PRG for residential land use. B(a)P concentrations were used for the comparison because of the compound's potential toxicity. Based on these comparisons, excess lifetime cancer risks of 3×10^{-4} were estimated for individual marsh crust borehole samples at Alameda Point. This level of risk was determined to be unacceptable for unrestricted use.

2.7.2 Ecological Risk Assessment

Several ERAs were conducted to evaluate whether contaminants in soil at Alameda Facility/Alameda Annex and at Alameda Point are causing adverse ecological impacts to the environment. The ERAs are discussed below.

Alameda Facility/Alameda Annex

The Navy conducted a qualitative ERA of terrestrial habitat at Alameda Facility/Alameda Annex (PRC 1996a). The terrestrial ERA found no potential risks to terrestrial receptors, because Alameda Facility/Alameda Annex has (1) limited and unsuitable habitat, (2) no endangered species that feed or nest on the facility, (3) a scarcity of mammalian receptors, and (4) contaminants found in deep soil (the marsh crust), with limited potential for adverse effects to terrestrial biota.

Alameda Point

ERAs have been conducted for OU-1 (TtEMI 1999a), OU-2 (TtEMI 1999g), and OU-3 (TtEMI 1999c); however, ERA results are not discussed further, because the marsh crust and former subtidal area are at a depth that prevents a completed exposure pathway for ecological receptors. Although wildlife habitats

are located at Alameda Point, excavation of the marsh crust and the former subtidal area in the future is not expected to create an ecological risk. This is because development and construction would generally not be conducted in established habitats, but in areas already modified by human activity, such as port facilities, office buildings, and runways, which comprise most of Alameda Point.

2.7.3 Basis for Action

Response actions selected in this RAP/ROD are considered to be necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

2.8 REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAO) are either medium or OU-specific goals for protecting human health and the environment. An RAO specifies (1) each COC, (2) the exposure route and each receptor, and (3) an acceptable contaminant concentration or range of concentrations for each exposure pathway and medium. The RAO discussed below was developed for the exposure route the Navy identified.

2.8.1 Remedial Action Objective for the Former Subtidal Area and Marsh Crust

This RAP/ROD is based on the possibility that future construction could raise contaminated material from the former subtidal area and marsh crust to the surface. Therefore, the RAO for the former subtidal area and marsh crust is to prevent potential future uncontrolled excavation and placement of marsh crust soil and former subtidal area soil at the surface, where they may pose an unacceptable risk to human health.

2.9 DESCRIPTION OF ALTERNATIVES

This section provides a concise description of the alternatives considered to address contamination in the marsh crust at Alameda Facility/Alameda Annex and Alameda Point and the former subtidal area at Alameda Point.

2.9.1 Remedial Alternatives for Marsh Crust and Former Subtidal Area

For the purpose of alternatives evaluation, marsh crust at Alameda Facility/Alameda Annex and the former subtidal area and marsh crust at Alameda Point were grouped together, based on common soil characteristics and contaminants. Four remedial alternatives were developed for contaminated marsh

crust underlying Alameda Facility/Alameda Annex and Alameda Point as well as the former subtidal area at Alameda Point (TtEMI 2000). These alternatives are described below.

Alternative 1: No Action. The no action alternative involves no remedial action and would leave contaminated marsh crust and former subtidal deposits in place as they currently exist.

Key components of this no action alternative are as follows:

- No restrictions, controls, or active remedial measures are applied to the site.
- The no action alternative is required by the NCP to serve as a baseline for evaluating other alternatives.

Common elements and distinguishing features of the no action alternative are as follows:

- No applicable or relevant and appropriate requirements (ARAR) apply to this alternative.
- This alternative is not reliable in the long term to protect public health and the environment.
- No material from the marsh crust or former subtidal area would be removed or treated, disposed of off site, or managed on site in a containment system under this alternative.
- Residual risk would remain at the site in the event that the marsh crust or former subtidal area materials are brought to the surface.

Estimated time for implementation:	None
Estimated time to meet RAO:	Indefinite
Estimated capital cost:	None
Estimated annual O&M cost:	None
Estimated total present worth cost:	None

The expected outcome of the no action alternative is as follows:

- No impacts to the community, current occupants, workers, or the environment are associated with the no action alternative, because this alternative would involve no construction.

Alternative 2: Land Use Controls. Under this alternative, land use controls would be implemented that would prevent excavation into the marsh crust and the former subtidal area, unless proper health and safety and disposal procedures are followed.

Key components of the land use controls alternative are as follows

- Environmental Restrictions in Deed

The Navy has included Environmental Restrictions addressing marsh crust land use controls pursuant to California Civil Code Section 1471 in the deeds transferring title to FISC Alameda and East Housing Portion of NAS Alameda to the City of Alameda on July 20, 2000. The Environmental Restrictions require that the City of Alameda and its transferees comply with the City of Alameda Ordinance No. 2824 (see Appendix B) passed on February 15, 2000, when excavating below specified threshold depths, or when excavating with DTSC approval if the Ordinance is repealed or DTSC determines that the Ordinance does not comply with the Covenant to Restrict Use of Property (discussed below in Item 2). These Environmental Restrictions shall be interpreted in a manner that is consistent with and does not conflict with the Covenant to Restrict Use of Property between DTSC and the City of Alameda. These Environmental Restrictions (1) run with the land; (2) are for the benefit of, and enforceable by, the Navy; (3) are binding upon future owners and occupants of the property; and (4) shall be enforced by the Navy when necessary and appropriate. The Deed provides that a failure to enforce the Environmental Restrictions in the Covenant between DTSC and the City of Alameda shall not preclude the Navy from enforcing the equivalent Environmental Restrictions in the Deed. In the future, deeds transferring title to former Navy properties included in the marsh crust and subtidal area of Alameda Point will contain these Environmental Restrictions, as appropriate.

- Covenant to Restrict Use of Property

On July 20, 2000, DTSC and the City of Alameda entered into a Covenant to Restrict Use of Property (Covenant) that includes Environmental Restrictions addressing marsh crust land use controls pursuant to California Civil Code Section 1471 and HSC Section 25355.5. The Environmental Restrictions prohibit excavation below specified threshold depths, except in compliance with the City of Alameda Ordinance No. 2824, passed on February 15, 2000 (see description below), or with DTSC approval if the Ordinance is repealed or DTSC determines that the Ordinance does not comply with the Covenant. The Covenant covers the FISCO Alameda Facility/Alameda Annex and Alameda Naval Air Station East Housing and contains Environmental Restrictions that (1) run with the land; (2) are for the benefit of, and enforceable by, DTSC; and (3) are binding upon future owners and occupants of the property. In the future, transfers of former Navy properties included in the marsh crust and subtidal area of Alameda Point will require a similar covenant.

- Marsh Crust Ordinance

The City of Alameda has enacted City of Alameda Ordinance No. 2824 on February 15, 2000, included as Appendix B, that prohibits engaging in any excavation below specified threshold depths on former Navy property without an excavation permit and without taking proper measures to ensure that workers are not unduly exposed and that all contaminated material brought to the surface is properly disposed of. The City of Alameda will directly implement and enforce the Ordinance. If the excavation

Ordinance is repealed in the future, or if DTSC has made a written determination with 30 days prior written notice to the City of Alameda that the excavation ordinance does not comport with the intent of the DTSC-City covenant, then a permitted excavation may be conducted only in accordance with a written approval issued by DTSC. The permittee's application for such an approval would be submitted to DTSC and would comply with the permit application requirements of the last version of the excavation ordinance or such other requirements as DTSC may specify.

A LUCICP will be prepared to document the roles and responsibilities for implementing, monitoring, and enforcing land use controls. The LUCICP will include the following elements:

- Site descriptions, a map showing the site locations and the approximate size of the site, and a description of any COCs
- The land-use control objectives and restrictions stated in the RAP/ROD
- The specific legal mechanism that will be used to achieve the RAP/ROD's land use control objectives and restrictions
- The required frequency for periodic inspections of the sites
- Identification of the entities responsible for implementation of monitoring and inspections
- Methods that will be used to periodically certify compliance with institutional controls upon completion of inspections
- Procedures for notifying the Navy and signatories to the FFSRA in the event of a failure to comply with land use restrictions

The draft LUCICP will be provided to FFSRA signatories and EPA for approval and to the LRA and the transferee for review.

Common elements and distinguishing features of the land-use control alternative are as follows:

- The land use Covenant and excavation ordinance components of this alternative will be implemented by DTSC and the City of Alameda. The Navy prepared, with input from the City of Alameda, the Environmental Restrictions in the Deed and will cooperate with implementation of the Covenant and Ordinance.
- The Navy and DTSC have identified state statutes as ARARs for implementing land use controls and entering into a land use covenant and agreements that include substantive provisions of California Civil Code Section 1471 and California HSC Sections 25202.5 and 25222.1.
- Pursuant to Assembly Bill 871, which became effective on January 1, 1999, DTSC is required to maintain a list of all land use restrictions recorded pursuant to HSC Sections 25200, 25200.10, 25202.5, 25222.1, 25229, 25230, 25355.5, and 25398.7. At a minimum, this list must provide the street address, or if a street address is not available,

an equivalent description of location for a rural location or the latitude and longitude of each property. DTSC is also required to (1) update the list as new land use restrictions are recorded; (2) make the list available to the public, upon request and (3) place the list on the DTSC Internet website.

- The substantive provision of Civil Code Section 1471 is the following general narrative standard: "...to do or refrain from doing some act on his or her own land...where... (c) Each such act relates to the use of land and each such act is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous materials, as defined in Section 2560 of the Health and Safety Code." This narrative standard would be implemented through incorporation of restrictive environmental covenants in the deed at the time of transfer. These covenants would be recorded with the environmental restriction covenant and agreement and run with the land.
- The substantive provision of HSC Section 25202.5 is the general narrative standard to restrict "present and future uses of all or part of the land on which the ...facility...is located..." These substantive provisions will be implemented by incorporation of restrictive environmental covenants in the environmental restriction covenant and agreement at the time of transfer for purposes of protecting present and future public health and safety.
- California HSC Section 25222.1 provides the authority for the state to enter into voluntary agreements to establish land use covenants with the owner of the property. HSC Section 25222.1, Land Use Covenant Agreement, is in the form of an agreement, and this procedural form does not qualify as a legally binding "applicable or relevant and appropriate" requirement under CERCLA, because it is administrative (procedural) in nature. The substantive provision of HSC Section 25222.1 is the general narrative standard: "restricting specified uses of the property." The substantive provisions of HSC Section 25222.1 may be interpreted in a manner consistent with the substantive provisions of Civil Code Section 1471. The covenants would be recorded with the deed and would run with the land.
- The appropriate and relevant portions of California HSC Sections 25202.5, 25221.1, 25230, 25232, and 25233 and California Civil Code Section 1471 shall also be implemented through the deed between the Navy and the transferee.
- EPA does not agree with the Navy and DTSC that the sections of the California Civil Code and HSC cited above are ARARs. These state regulations fail to meet the criteria for ARARs stated in EPA guidance – that is, they are administrative and not substantive requirements that establish a discretionary way to implement land use restrictions. Although EPA does not agree that these state regulations require the Navy to enter into a land use covenant with DTSC, EPA believes that, if necessary for the protection of human health and the environment, it may be appropriate for the facility to enter into an enforceable written agreement with DTSC in order to enforce land use restrictions at a site.
- No chemical-specific ARARs are pertinent to this alternative.

- This alternative is reliable in the long term to protect the public health and the environment, as long as the Covenant, Ordinance, and deed restrictions remain enforceable.
- No material from the marsh crust or former subtidal area would be removed, disposed of off site, or managed on site, except as permitted by DTSC.
- Residual risk would remain at the site; however, human health would be protected by restricting excavation into the marsh crust and former subtidal area without obtaining the required permits and taking proper health and safety measures to protect on-site workers and to dispose of excavated soil.

Estimated time for implementation:	Less than 2 months
Estimated time to meet RAO:	Less than 2 months
Estimated capital cost:	\$12,500
Estimated 5-year review cost:	\$5,000
Discount rate:	7 percent
Performance period for 5-year review:	30 years
Estimated total present worth cost:	\$59,800

Expected outcomes of the land use controls alternative are as follow:

- The timeframe to implement this alternative is immediate. Because land use controls would restrict site occupants from excavating into the marsh crust without obtaining required permits and taking proper measures to dispose of excavated soil, installations (excluding areas requiring remediation of soil above the marsh crust) should be available for residential or industrial uses. Groundwater use would still be restricted under existing state regulations.
- No impacts to the community, current occupants, workers, or the environment are associated with implementation of the land-use controls alternative, because it would involve no construction.

Alternative 3: Excavation and Off-site Disposal. This alternative involves excavation and transportation of the marsh crust and former subtidal area for off-site disposal in a Class I, Class II, or Class III landfill, depending on the appropriate waste classification. The volume of soil that would be disturbed would be extremely large, because the alternative would consist of excavating the entire surface area (143 acres) of Alameda Facility/Alameda Annex to an average depth of 16.5 feet and 548 acres of Alameda Point to an average depth of 9.5 feet, approximately 1.5 feet below the average depth of the former subtidal area and marsh crust.

Key components of the excavation and off-site disposal alternative are as follows:

- The site would be divided into several areas that can be accessed by construction equipment.
- Overburden would be excavated first and stockpiled on site.
- The former subtidal area and marsh crust material would be excavated.
- Confirmation samples would be collected to evaluate whether the former subtidal area and marsh crust had been sufficiently removed.
- Excavated areas would be restored by backfilling with overburden and clean fill.
- Shoring would be provided when the depth of excavation exceeded 5 feet bgs.
- A dewatering pumping system would be installed to remove water from excavation pits.
- Contaminated water generated during excavation operations would be treated on site using a granular activated carbon (GAC) process or air stripping and would be discharged into the sanitary sewer.
- Spent GAC would be transported off site for contaminant destruction and GAC regeneration at an approved facility.

Common elements and distinguishing features of the excavation and off-site disposal alternative are as follows:

- No chemical-specific ARARs have been identified for Alternative 3. Cleanup goals would be established using a risk-based analysis.
- Alternative 3 would comply with all location- and action-specific ARARs. Excavation and disposal activities would be conducted, to the maximum extent practicable, consistent with the San Francisco Bay Plan (revised June 1998), because they may affect resources of the coastal zone at adjacent facilities. In addition, the Navy has identified Section 5650 of the California Fish and Game Code as being relevant and appropriate for Alternative 3. Section 5650 prohibits deposition of materials deleterious to fish into waters of the state. Excavation would be conducted in a manner that would prevent deposition of contaminated material into the Oakland Inner Harbor that could be deleterious to birds or fish that live there.
- The Navy's excavation and disposal could trigger a variety of hazardous waste requirements under the California Hazardous Waste Control Law (California HSC Section 25100 and following sections). These requirements would specify how excavated soil (the former subtidal area and the marsh crust and overburden) and extracted groundwater must be managed. The Navy would analyze samples from excavated soil and extracted groundwater in accordance with hazardous waste identification regulations in Title 22 of the California Code of Regulations (CCR), Division 4.5, Chapter 11, Articles 2 and 3 to assess whether soils and groundwater exhibit state or federal hazardous waste characteristics. Soils in the former subtidal area

and the marsh crust and other media that qualify as hazardous waste would be managed in accordance with the substantive generator requirements in 22 CCR, Division 4.5, Chapter 12, 22 CCR Section 66262.34. Soils would be stockpiled within the area of contamination; therefore, minimum technology requirements and land disposal restrictions would not be triggered. As appropriate, extracted overburden and groundwater would be evaluated in accordance with 22 CCR, Division 4.5, Chapter 18, Article 1, 22 CCR § 66268.7(a) to determine whether they were subject to land disposal restrictions prior to disposal off site.

- In addition, if it is not hazardous waste, soils from the marsh crust and former subtidal area would be characterized in accordance with Title 27 requirements for nonhazardous solid waste and designated waste to determine if the material must be disposed of at a Class II or III landfill.
- Several Bay Area Air Quality Management District (BAAQMD) regulations are potential ARARs for excavation activities. First, substantive requirements in BAAQMD Regulations 6 and 8-40 would be ARARs for excavation. Specifically, Regulations 6-301, 6-302, and 6-305, which specify standards for particulates and visible emissions, are applicable to limit dust and particulates emissions during excavation and removal of soils. The Navy would take appropriate actions, such as water spraying, to control dust emissions during excavation and transport. Regulation 8-40-301, which limits uncontrolled aeration, and Regulation 8-40-303, which contains requirements for soil storage piles, are also ARARs for soil stockpiling.
- The treatment of extracted groundwater by air stripping would be designed to comply with the substantive provisions of BAAQMD requirements in Regulation 8-47. The treated groundwater would be discharged under permit to a publicly owned treatment works.
- In addition to air regulations, the Navy has identified precipitation and drainage requirements for soil stockpiling in 23 CCR, Division 3, Chapter 15, Section 2546, as relevant and appropriate to Alternative 3, assuming that the soil must be managed as a hazardous waste. Because off-site transportation and disposal requirements are not ARARs, both substantive and administrative requirements would be followed.
- Alternative 3 is reliable in the long term, because removing the source would permanently eliminate residual risks.
- The amount of untreated soil that would require off-site disposal in a Class I, Class II, or Class III landfill is about 2,287,142 cubic yards (yd³). The degree of hazard remaining in the material at the disposal facility would be minimal, because the off-site disposal facility would meet off-site disposal regulations in 40 CFR 300.440.

Estimated time for implementation:	2 years
Estimated time to meet RAO:	2 years
Estimated capital cost:	\$1.564 billion
Estimated annual O&M costs:	Included in the capital cost

Discount rate:	7 percent
Period of performance	2 years
Estimated total present worth cost:	\$1.564 billion

Expected outcomes of the excavation and off-site disposal alternative:

- The timeframe to achieve this alternative is about 2 years. Because the excavation and off-site disposal alternative would permanently eliminate the source of contamination and potential pathways, the site would be available for unrestricted use. Groundwater use would still be restricted under existing state regulations.
- The excavation and off-site disposal alternative would create significant short-term risks to the community, site workers, and the environment because of the massive excavation, stockpiling, and transportation of marsh crust and former subtidal area required.

Alternative 4: Excavation and On-site Treatment with Thermal Desorption. This alternative includes excavating contaminated marsh crust and the former subtidal area, on-site treatment of the excavated material using a thermal desorption process, and backfilling and restoring excavation areas with treated soil. The average anticipated excavation depth would be approximately 16.5 feet bgs at the Alameda Facility/Alameda Annex and 9.5 feet bgs at Alameda Point. The total volume of soil to be remediated is estimated at about 2,287,142 yd³.

Key components of the excavation and on-site thermal desorption alternative are as follows:

- The site would be divided into several areas that could be accessed by construction equipment.
- Overburden would be excavated first and stockpiled on site.
- The former subtidal area and marsh crust material would be excavated.
- Confirmation samples would be collected to show that the former subtidal area and marsh crust had been sufficiently removed.
- Excavated soil would be treated on site by thermal desorption.
- Organic compounds in the vapor phase would be collected and burned in an afterburner.
- Particulate matter would be removed by conventional air pollution control methods.
- Treatment residual streams would be properly managed to meet state and federal requirements.
- Trial-burn test runs would be conducted before operation of the thermal desorption unit.

- Excavated areas would be restored by backfilling with overburden and treated soil.
- Shoring would be provided when the depth of excavation exceeded 5 feet bgs.
- A dewatering pumping system would be installed to remove water from excavation pits.
- Contaminated water generated during excavation operations would be treated on site using a GAC process or air stripping and would be discharged into the sanitary sewer.
- Spent GAC would be transported off site for contaminant destruction and GAC generation at an approved facility.

Common elements and distinguishing features of Alternative 4 are as follows:

- No chemical-specific ARARs have been identified for Alternative 4. Cleanup goals would be established using a risk-based analysis.
- Alternative 4 would comply with all location- and action-specific ARARs. As stated in Alternative 3, the Navy would comply with all hazardous waste ARARs identified for excavation and handling of contaminated media, and these same ARARs would be followed for this alternative. These ARARs are described under Alternative 3. In addition, the substantive environmental performance standards of 22 CCR 66264.601 (miscellaneous units) are relevant and appropriate for operating the thermal desorption unit if soil must be managed as a hazardous waste. BAAQMD Regulation 2-2-301, which requires use of best available control technologies, may also be relevant and appropriate for treating the former subtidal area and the marsh crust and possibly contaminated groundwater by thermal desorption if nitrogen oxides, volatile organic chemicals (VOCs), SVOCs, or other ozone precursors could be emitted in sufficient quantities for the facility to be considered a new source under BAAQMD rules. Removing and treating the source under this alternative permanently eliminates residual risks.
- The treatment of extracted groundwater by air stripping would be designed to comply with the substantive provisions of BAAQMD requirements in Regulation 8-47. The treated groundwater would be discharged under permit to a POTW.
- Alternative 4 is reliable in the long term, because removing the source and treating the material under this alternative would permanently eliminate residual risks.
- Treated soil would be returned to the site for use in backfilling. Clean off-gas would be released to the atmosphere. No hazard would remain in the treatment residuals because of the demonstrated effectiveness of the thermal desorption process for COCs in the marsh crust and former subtidal area.

Estimated time for implementation:	2 years
Estimated time to meet RAO:	2 years
Estimated capital cost:	\$981 million

Estimated annual O&M costs:	Included in the capital cost
Discount rate:	7 percent
Period of performance:	2 years
Estimated total present worth cost:	\$981 million

Expected outcomes of Alternative 4:

- The timeframe to achieve this alternative is 2 years. Because Alternative 4 permanently would eliminate the source of contamination and treat the source material, the site should be available for unrestricted use. Groundwater use would still be restricted under existing state regulations.
- Alternative 4 could create significant short-term risks to the community, site workers, and the environment because of the massive excavation, stockpiling, and treatment of the contaminated material required.

2.10 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The following sections summarize the comparative analysis of alternatives for the marsh crust and former subtidal area against the EPA's nine evaluation criteria. The comparative analysis provides the information needed to decide which alternative or alternatives best satisfies the goals and expectations of the NCP. The discussion of each evaluation criterion generally proceeds from the alternative that best satisfies the criterion to the one that least satisfies the criterion. The nine criteria are summarized as follows:

- **Overall protection of human health and the environment.** This criterion address whether a remedy provides adequate protection of human health and the environment and describes how risks posed by each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or land use controls.
- **Compliance with applicable or relevant and appropriate requirements.** This evaluation criterion is used to determine whether each remedy will meet all ARARs or provide grounds for invoking a waiver of the requirements. This criterion includes chemical-, location-, and action-specific ARARs.
- **Long-term effectiveness and permanence.** This criterion evaluates the long-term effectiveness of alternatives in protecting human health and the environment after response objectives have been met, in terms of the magnitude of residual risk and the adequacy and reliability of controls.
- **Reduction of toxicity, mobility, or volume through treatment.** This criterion evaluates treatment technologies that an alternative may employ based on their degree of expected reduction in toxicity, mobility, or volume of hazardous material. This criterion

also evaluates the irreversibility of the treatment process and the type and quantity of residuals that remain after treatment.

- **Short-term effectiveness.** This criterion addresses the effectiveness of alternatives in protecting human health and the environment during remedial construction and implementation until the remedial action is complete.
- **Implementability.** This criterion addresses the technical and administrative feasibility of alternatives and the availability of required goods and services. It assesses the ability to construct and operate the technology, the reliability of the technology, the ease of undertaking additional remedial actions, and the ability to obtain approvals from other agencies.
- **Cost.** This criterion addresses the capital and O&M costs of each alternative and estimates of the total present worth cost of each alternative.
- **State acceptance.** This criterion addresses whether the state concurs with, opposes, or has no comment on the Navy's preferred alternative.
- **Community acceptance.** This criterion indicates whether community concerns are addressed by each cleanup method and whether the community has indicated a preferred cleanup method. Community acceptance of the Navy's proposed plan was evaluated based on comments received during the public comment period. Community concerns are documented in the responsiveness summary presented in Appendix C of this RAP/ROD.

Table 2 summarizes the comparative analysis of alternatives for the marsh crust and former subtidal area at Alameda Facility/Alameda Annex and Alameda Point.

Overall Protection of Human Health and the Environment

All alternatives, including Alternative 1, no action, would protect human health and the environment under current land uses. However, Alternative 1 is not protective in the event that the marsh crust and the former subtidal area were excavated and disposed of on the surface without proper controls. Alternative 2 (land use controls) provides a reliable method of restricting excavation of the marsh crust and former subtidal area, unless proper health and safety and disposal procedures are followed. With regard to short-term risks, Alternatives 1 and 2 are more effective in protecting the community, current occupants, site workers, and the environment than are Alternatives 3 and 4, because no construction would occur under Alternatives 1 and 2. Massive disruption to the environment and the community would be caused by the construction involved in implementing Alternatives 3 and 4.

Compliance with ARARs

No ARARs apply to Alternative 1. Alternatives 3 and 4 would comply with the identified location- and action-specific ARARs. For Alternative 2, DTSC and City of Alameda would draft the Covenant in accordance with the action-specific ARARs of the California Civil Code and HSC. Deed restrictions drafted by the Navy and the City of Alameda would also comply with these action-specific ARARs.

Long-term Effectiveness and Permanence

Alternatives 3 and 4 would provide the highest level of long-term effectiveness and permanence, because the former subtidal area and marsh crust would be excavated. No significant residual risks would remain, and the potential for exposure to hazardous substances in the marsh crust and the former subtidal area would be eliminated. Both Alternatives 3 and 4 would be adequate and reliable, because they would result in removal of the former subtidal area and the marsh crust. The potential for residual risks from contaminants in the former subtidal area and marsh crust would remain under Alternative 2; however, human health would be protected by restricting excavation in the former subtidal area and marsh crust, unless health and safety and disposal procedures were adequate to minimize exposure. No remedial action would be conducted under Alternative 1; therefore, Alternative 1 would provide no long-term effectiveness or permanence, and residual risk would remain at the site in the unlikely event that the former subtidal area and marsh crust were brought to the surface.

Reduction in Toxicity, Mobility, or Volume through Treatment

Only Alternative 4 uses treatment to reduce the toxicity, mobility, and volume of contaminants in the former subtidal area and marsh crust. None of the other alternatives involve treatment.

Short-term Effectiveness

Because no site construction would be required under Alternatives 1 and 2, both would provide the highest level of short-term protection to the community, workers, and the environment. Both Alternatives 3 and 4 provide less short-term effectiveness because of the massive excavation required in the former subtidal area and marsh crust and because large quantities of contaminated soil and groundwater (as a result of dewatering) must be managed. In addition, Alternative 3 could pose an additional short-term risk to the public as a result of the increased truck traffic associated with transporting excavated soil from the former subtidal area and the marsh crust off site for disposal.

Implementation of Alternatives 1 and 2 would have no impact on the environment, because no construction would be involved. Both Alternatives 3 and 4 would have significant, short-term adverse impacts to the environment from the complex nature of large-volume excavation of the area below groundwater and the treatment and handling of a large volume of contaminated soil or residual treatment materials. Both Alternatives 3 and 4 would destroy virtually all established habitat at the facilities.

Alternative 2 would require a minimal amount of time to implement, whereas Alternatives 3 and 4 would take several years to implement.

Implementability

Alternative 1 would be easy to implement, because no action would be taken. Alternative 2 could be implemented without significant delays, because no construction is involved, although negotiations between the City of Alameda and DTSC and between the Navy and the City of Alameda are required. Both Alternatives 3 and 4 would be difficult to implement when compared with Alternatives 1 and 2 because of the complex nature of site conditions (described earlier), the excavation of a large area at depths below groundwater, and the requirements for managing a large volume of contaminated soil and treatment residuals.

Cost

No known costs would be associated with Alternative 1. Only minimal costs (approximately \$59,800) would be associated with selecting Alternative 2 (land use controls) for both facilities. The estimated costs of implementing Alternatives 3 and 4 would be \$1.564 billion and \$981.7 million, respectively. Although these cost figures are only estimates, with a possible margin of error of between minus 30 and plus 50 percent, the costs would be vastly greater than for Alternatives 1 and 2. The costs of implementing Alternatives 3 and 4 are excessive when compared to Alternatives 1 and 2.

State Acceptance

Based on this RAP/ROD, DTSC and RWQCB believe that land use controls are the preferred remedy for the marsh crust and former subtidal area.

Community Acceptance

Community acceptance of this alternative is favorable. Specific comments from the public and the Navy's responses are included in the responsiveness summary (see Appendix E).

2.11 PRINCIPAL THREAT WASTES

Hazardous substances are present in the marsh crust at Alameda Facility/Alameda Annex. At Alameda Point, hazardous substances are present in the marsh crust and former subtidal area. However, these substances are considered to be low-level wastes because of their low concentrations and toxicity.

2.12 SELECTED REMEDY

The rationale for the selected remedy, a description of the selected remedy, estimated remedy costs, and the expected outcomes of the selected remedy are described in detail below for the marsh crust and subtidal area at Alameda Facility/Alameda Annex and Alameda Point.

Selected Remedy for the Marsh Crust and Former Subtidal Area

Based on CERCLA requirements, BRAC program goals, future land uses of the Alameda Facility/Alameda Annex and Alameda Point (a mixed reuse of residential, commercial, and industrial), and the comparative analysis of alternatives in this RAP/ROD, the Navy and DTSC, with the concurrence of RWQCB, have chosen land use controls (Alternative 2) as the selected remedy for the marsh crust and former subtidal area.

Summary of the Rationale for the Selected Remedy

For the marsh crust and former subtidal area, the comparative analysis indicates that Alternative 2 (land use controls), consisting of excavation requirements that would be implemented through a land use covenant between the City of Alameda and the state, City of Alameda Ordinance No. 2824, and deed restrictions, provides overall protection of human health and the environment, meets the threshold criteria for remedy selection, and is cost-effective. Alternative 1 will not be protective of public health and the environment. Alternatives 3 and 4 offer protection of human health and the environment; however, they may be less effective in the short term because of the disruption expected from such a massive excavation and either off-site disposal or on-site treatment. In addition, the costs for implementing Alternatives 3 and 4 are excessive when compared with Alternatives 1 and 2. According to the NCP (40 CFR

300.430(e)(7)(iii)), “. . . costs that are grossly excessive compared to the overall effectiveness of alternatives may be considered as one of the several factors used to eliminate alternatives.” Although this NCP provision is specifically directed to the screening of remedial alternatives, it is also relevant to the comparative analysis of alternatives under a RAP/ROD. Consideration of Alternatives 3 and 4 shows that they would provide no greater effectiveness or implementability than Alternative 2 and at a grossly excessive cost.

Description of the Selected Remedy

The selected remedy for remediating the marsh crust soil and former subtidal area is land use controls. The selected remedy would prohibit excavation within the marsh crust and former subtidal area, unless proper precautions are taken to protect worker health and safety and to ensure that excavated material is disposed of properly. This prohibition will be implemented through a land use covenant between DTSC and the City of Alameda, Environmental Restrictions in Deed imposed by the Navy, and City of Alameda Ordinance No. 2824. No active engineering or construction would be required. Roles and responsibilities for implementing and enforcing the land use controls would be documented in a LUCICP. The LUCICP will address the following elements:

- Site descriptions, a map showing the site locations and the approximate size of the site and a description of any COCs
- The land-use control objectives and restrictions stated in the RAP/ROD
- The specific legal mechanism that will be used to achieve the RAP/ROD’s land use control objectives and restrictions
- The required frequency for periodic inspections of the sites
- Identification of the entities responsible for implementation of the monitoring and inspections
- Methods to be used to periodically certify compliance with institutional controls upon completion of inspections
- Procedures for notifying the Navy and signatories to the FFSRA in the event of a failure to comply with land use restrictions

The draft LUCICP will be provided to the FFSRA signatories and EPA for approval and to the LRA and the transferee for review.

Specific actions required to implement the selected remedy include the following:

- Environmental Restrictions in Deed

The Navy has included Environmental Restrictions addressing marsh crust land use controls pursuant to California Civil Code Section 1471 in the deeds transferring title to FISC Alameda and East Housing Portion of NAS Alameda to the City of Alameda on July 20, 2000. The Environmental Restrictions require that the City of Alameda and its transferees comply with City of Alameda Ordinance No. 2824 passed on February 15, 2000, when excavating below specified threshold depths or when excavating with DTSC approval if the Ordinance is repealed or DTSC determines that the Ordinance does not comply with the Covenant to Restrict Use of Property (discussed below in Item 2). These Environmental Restrictions shall be interpreted in a manner that is consistent with and does not conflict with the Covenant to Restrict Use of Property between DTSC and the City of Alameda. These Environmental Restrictions (1) run with the land; (2) are for the benefit of, and enforceable by, the Navy; (3) are binding upon future owners and occupants of the property; and (4) shall be enforced by the Navy when necessary and appropriate. The Deed provides that a failure to enforce the Environmental Restrictions in the Covenant between DTSC and the City of Alameda shall not preclude the Navy from enforcing the equivalent Environmental Restrictions in the Deed. In the future, deeds transferring title to former Navy properties included in the marsh crust and subtidal area of Alameda Point will contain these environmental restrictions, as appropriate.

- Covenant to Restrict Use of Property

On July 20, 2000, DTSC and the City of Alameda entered into a Covenant to Restrict Use of Property (Covenant) that will include Environmental Restrictions addressing marsh crust land use controls pursuant to California Civil Code Section 1471 and HSC Section 25355.5. The Environmental Restrictions prohibit excavation below specified threshold depths, except in compliance with the City of Alameda Ordinance No. 2824 passed on February 15, 2000 (see description below) or with DTSC approval if the Ordinance is repealed or DTSC determines that the Ordinance does not comply with the Covenant. The Covenant covers the FISCO Alameda Facility/Alameda Annex and Alameda Naval Air Station East Housing and contains Environmental Restrictions that (1) run with the land; (2) are for the benefit of, and enforceable by, DTSC; and (3) are binding upon future owners and occupants of the property. In the future, transfers of former Navy properties included in the marsh crust and subtidal area of Alameda Point will require a similar covenant.

- Marsh Crust Ordinance

The City of Alameda has enacted City of Alameda Ordinance No. 2824 passed on February 15, 2000, and included as Appendix B, that prohibits engaging in any excavation below specified threshold depths on former Navy property without an excavation permit and without taking proper measures to ensure that workers are not unduly exposed and that all contaminated material brought to the surface is properly disposed of. The City of Alameda will directly implement and enforce the Ordinance. If the excavation Ordinance is repealed in the future, or if DTSC has made a written determination with 30 days prior written notice to the City of Alameda that the excavation ordinance does not comport with the intent of the DTSC-City covenant, then a

permitted excavation may be conducted only in accordance with written approval by DTSC. The permittee's application for such an approval will be submitted to DTSC and will comply with the permit application requirements of the last version of the excavation ordinance or such other requirements as DTSC may specify.

Summary of the Estimated Remedy Costs

Estimated capital cost:	\$12,500
(Includes \$10,000 to draft land use control documents and six 5-year reviews, \$5,000 per event)	
Discount rate:	7 percent
Estimated total present worth cost:	\$59,800

The information in this cost estimate summary is based on the best available information and engineering judgment regarding the anticipated scope of the remedial alternative. Cost elements are likely to change as a result of new information and data collected during implementation of the remedial alternative. Major changes would be documented as a memorandum in the administrative record file, an explanation of significant differences, or an amendment to the RAP/ROD. This order-of-magnitude engineering cost estimate is expected to be within plus 50 to minus 30 percent of the actual project cost.

Expected Outcomes of the Selected Remedy

Land use controls will restrict excavation into the marsh crust without the required permits and will require proper measures to dispose of excavated soil, excluding those areas requiring remediation of soil above the marsh crust. Therefore, the facilities would be available for residential or industrial use.

This response action is intended to control risks posed by excavation that could bring marsh crust to the surface, where it could remain as a source of exposure and could pose an unacceptable risk to human health or the environment. Under current conditions, the marsh crust and former subtidal area do not pose a risk to human health or the environment because of their depth. The selected remedy would meet the RAO, because land use controls will prevent exposure at levels that may pose a threat to human health by prohibiting excavation of the marsh crust and former subtidal area below a certain depth without an excavation permit. Also, the remedy will require that proper health and safety and disposal procedures be followed. Land use controls contain mechanisms and procedures to allow DTSC to enforce them.

2.13 STATUTORY DETERMINATIONS

CERCLA Section 121 establishes several statutory requirements and preferences. They specify that, when complete, the selected remedial action for the installations must be protective of human health and the environment and must comply with applicable or relevant and appropriate standards established under federal and state environmental laws, unless a statutory waiver is justified. The selected remedy also must be cost-effective and use permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment technologies that permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances as their principal element. The following section discusses how the selected remedy meets the statutory requirements.

2.13.1 Protection of Human Health and the Environment

The selected remedy (Alternative 2, land use controls) is protective of human health and the environment, as required by Section 121 of CERCLA, because it restricts any future pathways that would expose humans to contaminants in the marsh crust or former subtidal area.

2.13.2 Compliance with ARARs

DTSC and the City of Alameda implemented the Covenant to Restrict Use of Property and marsh crust Ordinance components of the selected remedy, and the Navy has implemented the Environmental Restrictions in Deed. The ARARs include substantive provisions of California Civil Code Section 1471 and California HSC Sections 25202.5 and 25222.1. Specifically, the substantive provisions are as follows:

- Civil Code 1471: “. . . to do or refrain from doing some act on his or her own land . . . where . . . : (c) Each such act relates to the use of land and each such act is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous material, as defined in Section 25260 of the Health and Safety Code.”
- HSC Section 25202.5: to restrict “. . . present and future uses of all or part of the land on which the . . . facility . . . is located”
- HSC Section 25222.1: “. . . restricting specified uses of the property.”

These ARARs are discussed in detail in Section 2.9.1. The substantive provisions of California Civil Code Section 1471 and HSC Sections 25202.5 and 25222.1 are implemented through the Covenant between the City of Alameda and DTSC and through the Environmental Restrictions in Deed implemented by the Navy.

2.13.3 Cost-Effectiveness

The selected remedy (Alternative 2, land use controls) is cost effective. The costs for implementing Alternatives 3 and 4 are grossly excessive when compared to the selected remedy. According to the NCP (40 CFR 300.430(e)(7)(iii)), “. . . costs that are grossly excessive compared to the overall effectiveness of alternatives may be considered as one of the several factors used to eliminate alternatives.”

2.13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable

The land-use control alternative (Alternative 2) provides the best balance of tradeoffs among the three alternatives that address the contaminated marsh crust and former subtidal area. All alternatives (except the no action alternative) meet the two threshold criteria of protectiveness and achievement of ARARs. Alternatives 3 and 4 afford better long-term effectiveness than Alternative 2, because they remove the contamination from the site. Only Alternative 4 reduces the toxicity, mobility, or volume of the contaminants through treatment. With respect to short-term effectiveness, Alternative 2 is highly protective, because it involves leaving the contaminated materials at a depth where they are unlikely to cause a threat to human health. The short-term effectiveness of Alternatives 3 and 4 are considered to be low because of extensive on-site handling requirements of contaminated material, and the large-scale disruption of current activities on the facilities while years of excavation, treatment, and backfilling are completed. Off-site transportation of the excavated material will increase traffic in adjacent neighborhoods and increase the potential for uncontrolled releases of contaminated material along the route to off-site disposal units. On-site thermal treatment also creates a threat of uncontrolled air emissions from equipment upsets. With respect to the implementability criteria, Alternative 2 presents a better tradeoff than Alternatives 3 and 4, because there is no mobilization of equipment, no permits to secure, and no special engineering to overcome difficult site logistics. As discussed in Section 2.12.1, the tradeoff for implementing Alternative 3 or 4 instead of Alternative 2 is spending an excessive amount of the Navy's IRP funds which could be used to address contamination elsewhere at Alameda Facility/Alameda Annex and Alameda Point. Finally, community and state acceptance have historically been high for Alternative 2, which results in a more expeditious transfer of Navy property into public

hands than Alternative 3 and 4. To summarize, except for long-term effectiveness and permanence, Alternative 2 outweighed Alternatives 3 and 4 in all of the balancing and modifying criteria.

2.13.5 Preference for Treatment as a Principal Element

The selected remedy does not meet the statutory preference for treatment as a principal criterion, because no treatment is employed. Treatment was not considered to be easily implementable or cost-effective for the marsh crust and the former subtidal area at Alameda Facility/Alameda Annex and Alameda Point.

2.13.6 Five-year Review Requirements

Because the selected remedy will leave hazardous substances on site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted no less often than each 5 years after initiation of such remedial action to ensure that the selected remedy for the former subtidal area and marsh crust continues to provide adequate protection of human health and the environment.

2.14 DOCUMENTATION OF SIGNIFICANT CHANGES

No significant changes to the remedy selected in this RAP/ROD were required as a result of public comments received by the Navy. Appendix F identifies major text changes in the draft RAP/ROD that are now in this final RAP/ROD. These changes address comments from the public, EPA and DTSC on the Proposed Plan and draft RAP/ROD.

As a result of discussions with DTSC on groundwater at Alameda Facility/Alameda Annex it was decided to remove the groundwater at Alameda Facility/Alameda Annex from the final RAP/ROD. A separate RAP/ROD will be prepared for the groundwater at Alameda Facility/Alameda Annex. Appendix F identifies the major text changes associated with this change.

REFERENCES

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